IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application. An identifier indicating the status of each claim is provided.

Listing of Claims

1.   (Currently Amended) A data processing device for carrying out speech processing in which prediction taps for finding prediction values of the speech of high sound quality are extracted from the synthesized sound obtained on affording linear prediction coefficients and residual signals, generated from a preset code, to a speech synthesis filter, said speech of high sound quality being higher in sound quality than said synthesized sound, and in which said prediction taps are used along with preset tap coefficients to perform preset predictive calculations to find said prediction values of said speech of high sound quality, said device comprising:

 a prediction tap extracting unit configured to extract means for extracting from said synthesized sound said prediction taps used for predicting said speech of high sound quality, as target speech, the prediction values of which are to be found;

a class tap extraction means for extracting unit configured to extract a class tap, used for sorting said target speech to one of a plurality of classes, from said code, by way of classification;

a classification means for finding unit configured to find the class of said target speech based on said class tap;

an acquisition ~~means for acquiring~~ unit configured to acquire said preset tap coefficients associated with the class of said target speech from among a plurality of tap coefficients as found on learning from class to class; and

a prediction ~~means for finding~~ unit configured to determine said prediction values of said target speech using said prediction taps and said preset tap coefficients associated with said class of said target speech.

2.   (Currently Amended Original) The data processing device according to claim 1 wherein said prediction unit performs~~means perform~~ one-dimensional linear predictive calculations, using said prediction taps and the tap coefficients, to find the prediction values of said target speech.

3.   (Currently Amended) The data processing device according to claim 1 wherein said acquisition unit is configured to acquire~~means acquires~~ said tap coefficients of the class associated with said target speech from a storage unit configured to store ~~means holding~~ said tap coefficients on the class basis.

4.   (Currently Amended) The data processing device according to claim 1 wherein said class tap extraction ~~means~~ unit extracts class taps from said code and from said linear prediction coefficients or residual signals obtained on decoding said code.

5.   (Previously Presented) The data processing device according to claim 1 wherein said tap coefficients have been obtained on carrying out learning so that prediction

errors of predicted values of the speech of high sound quality obtained on carrying out preset

predictive calculations employing said prediction taps and said tap coefficients will be

statistically minimum.

6.   (Original) The data processing device according to claim 1 further

comprising:

said speech synthesis filter.

7.   (Previously Presented) The data processing device according to claim 1

wherein said code has been obtained on encoding speech in accordance with a CELP (Code

Excited Linear Prediction Coding) system.

8.   (Original) A data processing method for carrying out speech processing

of extracting prediction taps for finding prediction values of the speech of high sound quality

from the synthesized sound obtained on affording linear prediction coefficients and residual

signals, generated from a preset code, to a speech synthesis filter, said speech of high sound

quality being higher in sound quality than said synthesized sound, and of performing preset

predictive calculations using prediction taps along with preset tap coefficients to find said

prediction values of said speech of high sound quality, said method comprising:

a prediction tap extracting step of extracting from said synthesized sound said

prediction taps used for predicting said speech of high sound quality, as target speech, the

prediction values of which are to be found;

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a class tap extraction step of extracting a class tap, used for sorting said target speech to one of a plurality of classes, by way of classification, from said code;

a classification step of finding the class of said target speech based on said class tap;

an acquisition step of acquiring said tap coefficients associated with the class of said target speech from among said tap coefficients as found on learning from class to class; and

a prediction step of finding said prediction values of said target speech using said prediction taps and said tap coefficients associated with said class of said target speech.

9.   (Previously Presented) A recording medium having recorded thereon a program for having a computer execute speech processing of extracting prediction taps for finding prediction values of the speech of high sound quality from the synthesized sound obtained on affording linear prediction coefficients and residual signals, generated from a preset code, to a speech synthesis filter, said speech of high sound quality being higher in sound quality than said synthesized sound, and of performing preset predictive calculations using said prediction taps along with preset tap coefficients to find said prediction values of said speech of high sound quality, said program comprising:

a prediction tap extracting step of extracting from said synthesized sound said prediction taps used for predicting said speech of high sound quality, as target speech, the prediction values of which are to be found;

a class tap extraction step of extracting class taps, used for sorting said target speech to one of a plurality of classes, by way of classification, from said code;

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a classification step of finding the class of said target speech based on said class taps;

an acquisition step of acquiring said tap coefficients associated with the class of said target speech from among said tap coefficients as found on learning from class to class; and

a prediction step of finding said prediction values of said target speech using said prediction taps and said tap coefficients associated with said class of said target speech.

10.   (Currently Amended) A learning device for learning preset class taps usable for finding, by preset predictive calculations, prediction values of the speech of high sound quality from the synthesized sound obtained on affording linear prediction coefficients and residual signals, generated from a preset code, to a speech synthesis filter, said speech of high sound quality being higher in sound quality than said synthesized sound, said learning device comprising:

a prediction tap extracting unit configured to extract ~~means for extracting~~ from said synthesized sound prediction taps used for predicting said speech of high sound quality, as target speech, the prediction values of which are to be found;

a class tap extraction unit configured to extract ~~means for extracting~~ class taps from said code, said class taps being used for classifying said speech of high sound quality, as target speech, the prediction values of which are to be found;

a classification unit configured to find ~~means for finding~~ a class of said target speech based on said class taps; and

a learning ~~means for carrying out learning~~ configured to learn so that prediction errors of the prediction values of the speech of high sound quality obtained on carrying out

predictive calculations using tap coefficients and said prediction taps will be statistically

minimum, to find said tap coefficients from class to class.

11. (Currently Amended) The learning device according to claim 10 wherein said learning ~~means~~unit carries out learning so that the prediction errors of the prediction values of the speech of high sound quality obtained on carrying out one-dimensional linear predictive calculations using said tap coefficients and the synthesized sound will be statistically minimum.

12. (Currently Amended) The learning device according to claim 10 wherein said class tap extraction unit~~means~~ extracts said class taps from said code and from said linear prediction coefficients and said residual signals obtained on decoding said code.

13. (Previously Presented) The learning device according to claim 10 wherein said code is obtained on encoding speech in accordance with a CELP (Code Excited Linear Prediction Coding) system.

14. (Previously Presented) A learning method for learning preset class taps usable for finding, by preset predictive calculations, prediction values of the speech of high sound quality from the synthesized sound obtained on affording linear prediction coefficients and residual signals, generated from a preset code, to a speech synthesis filter, said speech of high sound quality being higher in sound quality than said synthesized sound, said learning method comprising:

a prediction tap extraction step for extracting from said synthesized sound prediction taps used for predicting said speech of high sound quality, as target speech, the prediction values of which are to be found;

a class tap extraction step of extracting class taps from said code, said class taps being used for classifying said speech of high sound quality, as target speech, the prediction values of which are to be found;

a classification step of finding a class of said target speech based on said class taps; and

a learning step of carrying out learning so that prediction errors of the prediction values of the speech of high sound quality obtained on carrying out predictive calculations using tap coefficients and the synthesized sound will be statistically minimum, to find said tap coefficients from class to class.

15.   (Previously Presented) A recording medium having recorded thereon a program for having a computer execute learning processing of learning preset class taps usable for finding, by preset predictive calculations, prediction values of the speech of high sound quality from the synthesized sound obtained on affording linear prediction coefficients and residual signals, generated from a preset code, to a speech synthesis filter, said speech of high sound quality being higher in sound quality than said synthesized sound, said program comprising:

a prediction tap extraction step for extracting from said synthesized sound prediction taps used for predicting said speech of high sound quality, as target speech, the prediction values of which are to be found;

a class tap extraction step of extracting class taps from said code, said class taps being used for classifying said speech of high sound quality, as target speech, the prediction values of which are to be found;

a classification step of finding a class of said target speech based on said class taps; and

a learning step of carrying out learning so that prediction errors of the prediction values of the speech of high sound quality obtained on carrying out predictive calculations using tap coefficients and the synthesized sound will be statistically minimum, to find said tap coefficients from class to class.

16. -38. (Canceled)

39.   (Currently Amended) A speech processing device for finding prediction values of the speech of high sound quality from the synthesized sound obtained on affording linear prediction coefficients and residual signals, generated from a preset code, to a speech synthesis filter, said speech of high sound quality being higher in sound quality than said synthesized sound, comprising:

a prediction tap extraction ~~means for extracting~~ unit configured to extract prediction taps usable for predicting the speech of high sound quality, as target speech, the prediction values of which are to be found from said synthesized sound, said code and information derived from said code;

a class tap extraction ~~means for extracting~~ unit configured to extract class taps, usable for sorting the target speech to one of a plurality of classes, by way of classification, from said synthesized sound, said code and the information derived from said code;

an acquisition ~~means for acquiring~~ unit configured to acquire tap coefficients associated with the class of said target speech from the tap coefficients as found on learning from one class to another; and

a prediction ~~means for finding~~ unit configured to determine the prediction values of said target speech using said prediction taps and said tap coefficients associated with the class of said target speech.

40.   (Currently Amended) The speech processing device according to claim 39 wherein said prediction ~~means~~ unit effects one-dimensional linear predictive calculations, using said prediction taps and tap coefficients, to find prediction values of said target speech.

41.   (Currently Amended) The speech processing device according to claim 39 wherein said acquisition ~~means~~ unit acquires said tap coefficients of the class associated with said target speech from a storage unit configured to store ~~means holding~~ said tap coefficients from class to class.

42.   (Currently Amended) The speech processing device according to claim 39 wherein said prediction tap extraction ~~means~~ unit or class tap extraction ~~means~~ unit extracts said prediction taps or said class taps from said synthesized sound, said code or the information

derived from said code.

43.   (Previously Presented) The speech processing device according to claim 39 wherein said tap coefficients have been obtained on carrying out learning so that prediction errors of predicted values of said speech of high sound quality obtained on carrying out preset predictive calculations employing said prediction taps and tap coefficients will be statistically minimum.

44.   (Previously Presented) The speech processing device according to claim 39 further comprising:

a speech synthesis filter.

45.   (Previously Presented) The speech processing device according to claim 39 wherein said code has been obtained on coding the speech with CELP (Code Excited Linear Prediction Coding) system.

46.   (Previously Presented) A speech processing method for finding prediction values of speech of high sound quality from the synthesized sound obtained on affording linear prediction coefficients and residual signals, generated from a preset code, to a speech synthesis filter, said speech of high sound quality being higher in sound quality than said synthesized sound, comprising:

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a prediction tap extraction step of extracting prediction taps usable for predicting the speech of high sound quality, as target speech, the prediction values of which are to be found, from said synthesized sound, said code and information derived from said code;

a class tap extraction step of extracting a class tap, usable for sorting the target speech to one of a plurality of classes, by way of classification, from said synthesized sound, said code or the information derived from said code;

a classification step of finding the class of said target speech based on said class tap;

an acquisition step of acquiring tap coefficients associated with the class of said target speech from the tap coefficients as found on learning from one class to another; and

a prediction step of finding the prediction values of said target speech using said prediction taps and said tap coefficients associated with the class of said target speech.

47.   (Previously Presented) A recording medium having recorded thereon a program for having a computer execute speech processing of finding prediction values of speech of high sound quality from the synthesized sound obtained on affording linear prediction coefficients and residual signals, generated from a preset code, to a speech synthesis filter, said speech of high sound quality being higher in sound quality than said synthesized sound, said program comprising:

a prediction tap extraction step of extracting prediction taps usable for predicting the speech of high sound quality, as target speech, the prediction values of which are to be found from said synthesized sound, said code and information derived from said code;

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a class tap extraction step of extracting class taps, usable for sorting the target speech to one of a plurality of classes, by way of classification, from said synthesized sound, said code or information derived from said code;

an acquisition step of acquiring tap coefficients associated with the class of said target speech from the tap coefficients as found on learning from one class to another; and

a prediction step of finding the prediction values of said target speech using said prediction taps and said tap coefficients associated with the class of said target speech.

48.   (Currently Amended) A learning device for learning preset tap coefficients usable for finding, by preset predictive calculations, prediction values of speech of high sound quality, from the synthesized sound obtained on affording linear prediction coefficients and residual signals, generated from a preset code, to a speech synthesis filter, said speech of high sound quality being higher in sound quality than said synthesized sound, comprising:

a prediction tap extraction unit configured to extract ~~means for extracting~~ prediction taps usable in predicting the speech of high sound quality, as target speech, the prediction values of which are to be found, from said synthesized sound, said code and information derived from said code;

a class tap extraction unit configured to extract ~~means for extracting~~ class taps usable for sorting the target speech to one of a plurality of classes, by way of classification, from said synthesized sound, said code or the information derived from said code;

a classification ~~means for finding~~ unit configured to find the class of said target speech based on said class taps; and

a learning ~~means for carrying out learning~~ unit configured to learn so that

prediction errors of prediction values of said speech of high sound quality, obtained on carrying

out predictive calculations using said tap coefficients and said prediction taps, will be statistically

smallest.

49.   (Currently Amended) The learning device according to claim 48 wherein

said learning ~~means carries out learning~~ unit learns so that the prediction errors of the prediction

values of the speech of high sound quality obtained on carrying out one-dimensional linear

predictive calculations using said tap coefficients and the prediction taps will be statistically

smallest.

50.   (Currently Amended) The learning device according to claim 48 wherein

said prediction tap extraction ~~means~~ unit or class tap extraction ~~means~~ unit extract said prediction

taps or the class taps from the synthesized sound, said code and the information derived from

said code.

51.   (Original) The learning device according to claim 48 wherein said code

has been obtained on coding the speech with CELP (Code Excited Linear Prediction Coding)

system.

52.   (Previously Presented) A learning method for learning preset tap

coefficients usable for finding, by preset predictive calculations, prediction values of speech of

high sound quality, from the synthesized sound obtained on affording linear prediction

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coefficients and residual signals, generated from a preset code, to a speech synthesis filter, said

speech of high sound quality being higher in sound quality than said synthesized sound,

comprising:

a prediction tap extraction step of extracting prediction taps usable in predicting

the speech of high sound quality, as target speech, the prediction values of which are to be found,

from said synthesized sound, said code and information derived from said code;

a class tap extraction step of extracting a class tap usable for sorting the target

speech to one of a plurality of classes, by way of classification, from said synthesized sound, said

code or the information derived from said code;

a classification step of finding the class of said target speech based on said class

tap; and

a learning step of carrying out learning so that prediction errors of prediction

values of said speech of high sound quality, obtained on carrying out predictive calculations

using said tap coefficients and said prediction taps, will be statistically smallest, to find said tap

coefficients.

53.   (Previously Presented) A recording medium having recorded thereon a

program for having a computer execute learning processing of learning preset tap coefficients

usable for finding, by preset predictive calculations, prediction values of speech of high sound

quality, from the synthesized sound obtained on affording linear prediction coefficients and

residual signals, generated from a preset code, to a speech synthesis filter, said speech of high

sound quality being higher in sound quality than said synthesized sound, said program

comprising:

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prediction tap extraction step of extracting prediction taps usable in predicting the speech of high sound quality, as target speech, the prediction values of which are to be found, from said synthesized sound, said code and information derived from said code;

a class tap extraction step of extracting a class tap usable for sorting the target speech to one of a plurality of classes, by way of classification, from said synthesized sound, said code or the information derived from said code;

a classification step of finding the class of said target speech based on said class tap; and

a learning step of carrying out learning so that prediction errors of prediction values of said speech of high sound quality, obtained on carrying out predictive calculations using said preset tap coefficients and said prediction taps, will be statistically smallest, to find said tap coefficients.

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